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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,777	07/30/2003	Masahiro Yoshikawa	116722	7916

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EXAMINER
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VAN ROY, TOD THOMAS

ART UNIT	PAPER NUMBER
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2828

DATE MAILED: 01/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/629,777	Applicant(s) YOSHIKAWA, MASAHIRO	
	Examiner Tod T. Van Roy <i>m jrc</i>	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 19 and 21-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 19 and 21-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/14/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

The examiner acknowledges the amending of claims 19, 21 and 23, as well as the cancellation of claims 1-18, and 20, and the addition of claims 25-26.

The objections to the drawings, specification, and abstract are withdrawn as per the corrections filed within the response to the first office action.

### ***Response to Arguments***

Applicant's arguments with respect to claims 19 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 19, and 21, 23-26 are rejected under 35 U.S.C. 102(a) as being anticipated by Otoma et al. (JP2002-009393).

With respect to claims 19, 21 and 23, Otoma discloses a surface emitting semiconductor laser comprising: a substrate (fig.2 #101), a first mirror formed over the substrate, the first mirror including semiconductor layers of a first conductivity type (fig.2 #102, [0065]), a second mirror formed over the substrate,

Art Unit: 2828

the second mirror including semiconductor layers of a second conductivity type (fig.2 #106, [0065]), an active region disposed between the first and second mirrors (fig.2 #103, [0075]), a current confining layer disposed between the first and second mirrors (fig.2 #104a, [0109]), a compound semiconductor layer formed over the second mirror (fig.2 #107, GaAs [0109]) an electrode formed on the compound semiconductor layer (fig.2 #108, formed in ring based pattern with internal diameter forming the emission window, fig.1), and a protective film that covers the compound semiconductor layer and partially covers the electrode (fig.2 #109), wherein the electrode formed by a lift-off process ([0124]). The method of forming a device (plasma ashing) is not germane to the patentability of the device itself, therefore these limitations are not given patentable weight. At best these claims could be characterized as product-by-process claims, where the process limitations are not limiting, only the structure implied by the process. See MPEP 2113. Here, the structure implied by the process steps is merely the electrode structure disclosed by Otoma.

Claim 24 is rejected for the same reasons as claim 19. This claim merely details the methods of forming the device. The method of forming a device is not germane to the patentability of the device itself, therefore these limitations are not given patentable weight. At best this claim could be characterized as a product-by-process claim, where the process limitations are not limiting, only the structure implied by the process. See MPEP 2113. Here, the structure implied by the process steps is merely the structure of claim 19.

Art Unit: 2828

With respect to claims 25-26, Otoma further discloses the protective film covers the emission window (fig.1), and an insulation film (fig.2 #110), the electrode, and the protective film totally cover the compound semiconductor layer (fig.2).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otoma in view of Saito et al. (US 5945690).

With respect to claim 22, Otoma teaches the device as outlined in the rejection to claim 21, but does not teach the surface roughness of the GaAs contact layer to be not more than 5nm. Saito teaches a compound semiconductor device in which a GaAs layer (fig.11 #156) has a surface

Art Unit: 2828

roughness of less than 5nm (fig.12, roughness between 1 and 3 nm), and additionally teaches the use of GaAs as a contact layer (fig.7a,b #105). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting semiconductor laser of Otoma with the GaAs roughness of Saito in order to prevent optical refraction due to index variations and also reduce the resistance of the contact layer with the electrode.

Claims 19, 21, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwai et al. (US 2002/0110169) in view of Nakamura et al. (US 5563422).

With respect to claims 19, 21, and 23, Iwai teaches a surface emitting semiconductor laser comprising a substrate (fig.2 #10), a first mirror formed over the substrate with semiconductor layers of a first conductivity type (fig.2 #11, n-type), a second mirror formed over the substrate with semiconductor layers of a second conductivity type (fig.2 #15, p-type), an active region disposed between the first and second mirrors (fig.2 #12), a current confining layer disposed between the first and second mirrors (fig.2 #14a), a compound semiconductor layer formed over the second mirror (fig.2 #20a, p-type GaAs), and an electrode formed on the compound semiconductor layer (fig.2 #16), wherein the electrode is formed by a lift-off process ([0053]) utilizing an opening pattern ([0032], ring shaped electrode). The method of forming a device (plasma ashing) is not germane to the patentability of the device itself, therefore these limitations are

Art Unit: 2828

not given patentable weight. At best these claims could be characterized as product-by-process claims, where the process limitations are not limiting, only the structure implied by the process. See MPEP 2113. Here, the structure implied by the process steps is merely the electrode structure disclosed by Iwai. Iwai does not teach a protective film that covers the compound semiconductor layer and partially covers the electrode. Nakamura teaches a protective film (fig.7 #412) which covers a compound semiconductor layer (fig.7 #13) and part of an electrode (fig.7 #15), which is taught to be usable in a laser device (col.20 lines 35-40). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Iwai with the protective coating of Nakamura in order to protect the surfaces of the device from being scratched or peeling away upon application of a bond wire (Nakamura, col.10 lines 16-24).

Claim 24 is rejected for the same reasons as claim 19. This claim merely details the methods of forming the device. The method of forming a device is not germane to the patentability of the device itself, therefore these limitations are not given patentable weight. At best this claim could be characterized as a product-by-process claim, where the process limitations are not limiting, only the structure implied by the process. See MPEP 2113. Here, the structure implied by the process steps is merely the structure of claim 19.

With respect to claims 25-26, Iwai further teaches an insulation film (fig.2 #70), which in addition to the electrode covers the compound semiconductor layer (fig.2). Iwai does not teach a protective film to cover the emission window. Nakamura teaches a protective film (fig.7 #412) which covers

Art Unit: 2828

a compound semiconductor layer (fig.7 #13) and part of an electrode (fig.7 #15), having a transparent property for allowing the passage of light (col.10 lines 5-11), which is taught to be usable in a laser device (col.20 lines 35-40). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Iwai with the protective coating of Nakamura in order to protect the emission surface of the device from being scratched or peeling away upon application of a bond wire (Nakamura, col.10 lines 16-24), which could result in reduction of, or control of, usable light emitted from the device.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwai in view of Nakamura and Saito et al. (US 5945690).

With respect to claim 22, Iwai and Nakamura teach the device as outlined in the rejection to claim 21, but do not teach the surface roughness of the GaAs contact layer to be not more than 5nm. Saito teaches a compound semiconductor device in which a GaAs layer (fig.11 #156) has a surface roughness of less than 5nm (fig.12, roughness between 1 and 3 nm), and additionally teaches the use of GaAs as a contact layer (fig.7a,b #105). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting semiconductor laser of Iwai and Nakamura with the GaAs roughness of Saito in order to prevent optical refraction due to index variations and also reduce the resistance of the contact layer with the electrode.



Art Unit: 2828

**Conclusion**

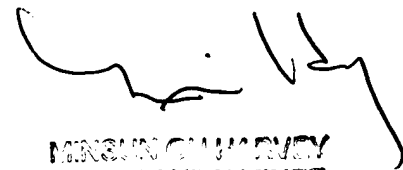
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6656759 speaking of plasma assisted processing steps for forming device structure, including electrodes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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